Package 'kernelFactory'

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Type Package

Title Kernel Factory: An Ensemble of Kernel Machines

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Imports randomForest, AUC, genalg, kernlab, stats

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Description Binary classification based on an ensemble of kernel machines (``Ballings, M. and Van den Poel, D. (2013), Kernel Factory: An Ensemble of Kernel Machines. Expert Systems With Applications, 40(8), 2904-2913''). Kernel factory is an ensemble method where each base classifier (random forest) is fit on the kernel matrix of a subset of the training data.

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NeedsCompilation no

Repository CRAN

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R topics documented:

Credit *Credit approval (Frank and Asuncion, 2010)*

Description

`Credit` contains credit card applications. The dataset has a good mix of continuous and categorical features.

Usage

```
data(Credit)
```

Format

A data frame with 653 observations, 15 predictors and a binary criterion variable called `Response`

Details

All observations with missing values are deleted.

Source

Frank, A. and Asuncion, A. (2010). UCI Machine Learning Repository [http://archive.ics.uci.edu/ml]. Irvine, CA: University of California, School of Information and Computer Science.

References

The original dataset can be downloaded at http://archive.ics.uci.edu/ml/datasets/Credit+Approval

Examples

```
data(Credit)
str(Credit)
table(Credit$Response)
```

kernelFactory *Binary classification with Kernel Factory*

Description

`kernelFactory` implements an ensemble method for kernel machines (Ballings and Van den Poel, 2013).

Usage

```
kernelFactory(x = NULL, y = NULL, cp = 1, rp = round(log(nrow(x), 10)),
  method = "burn", ntree = 500, filter = 0.01, popSize = rp * cp * 7,
  iters = 80, mutationChance = 1/(rp * cp), elitism = max(1, round((rp *
  cp) * 0.05)), oversample = TRUE)
```

Arguments

x	A data frame of predictors (numeric, integer or factor). Categorical variables need to be factors. Indicator values should not be too imbalanced because this might produce constants in the subsetting process.
y	A factor containing the response vector. Only {0,1} is allowed.
cp	The number of column partitions.
rp	The number of row partitions.
method	Can be one of the following: POLynomial kernel function (pol), LINear kernel function (lin), Radial Basis kernel Function rbf), random choice (random=pol, lin, rbf) (random), burn- in choice of best function (burn=pol, lin, rbf) (burn). Use random or burn if you don't know in advance which kernel function is best.
ntree	Number of trees in the Random Forest base classifiers.
filter	either NULL (deactivate) or a percentage denoting the minimum class size of dummy predictors. This parameter is used to remove near constants. For example if nrow(xTRAIN)=100, and filter=0.01 then all dummy predictors with any class size equal to 1 will be removed. Set this higher (e.g., 0.05 or 0.10) in case of errors.
popSize	Population size of the genetic algorithm.
iters	Number of generations of the genetic algorithm.
mutationChance	Mutationchance of the genetic algorithm.
elitism	Elitism parameter of the genetic algorithm.
oversample	Oversample the smallest class. This helps avoid problems related to the subsetting procedure (e.g., if rp is too high).

Value

An object of class kernelFactory, which is a list with the following elements:

trn	Training data set.
trnlst	List of training partitions.
rbfstre	List of used kernel functions.
rbfmtrX	List of augmented kernel matrices.
rsltsKF	List of models.
cpr	Number of column partitions.
rpr	Number of row partitions.
cntr	Number of partitions.

wghts	Weights of the ensemble members.
nmDtrn	Vector indicating the numeric (and integer) features.
rngs	Ranges of numeric predictors.
constants	To exclude from newdata.

Author(s)

Authors: Michel Ballings and Dirk Van den Poel, Maintainer: <Michel.Ballings@GMail.com>

References

Ballings, M. and Van den Poel, D. (2013), Kernel Factory: An Ensemble of Kernel Machines. Expert Systems With Applications, 40(8), 2904-2913.

See Also

predict.kernelFactory

Examples

```
#Credit Approval data available at UCI Machine Learning Repository
data(Credit)
#take subset (for the purpose of a quick example) and train and test
Credit <- Credit[1:100,]
train.ind <- sample(nrow(Credit),round(0.5*nrow(Credit)))

#Train Kernel Factory on training data
kFmodel <- kernelFactory(x=Credit[train.ind,names(Credit)!= "Response"],
          y=Credit[train.ind,"Response"], method=random)

#Deploy Kernel Factory to predict response for test data
#predictedresponse <- predict(kFmodel, newdata=Credit[-train.ind,names(Credit)!= "Response"])
```

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kFNews *Display the NEWS file*

Description

kFNews shows the NEWS file of the kernelFactory package.

Usage

```
kFNews()
```

Value

None.

Author(s)

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References

Ballings, M. and Van den Poel, D. (2013), Kernel Factory: An Ensemble of Kernel Machines. Expert Systems With Applications, 40(8), 2904-2913.

See Also

kernelFactory, predict.kernelFactory

Examples

```
kFNews()
```

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predict.kernelFactory *Predict method for kernelFactory objects*

Description

Prediction of new data using kernelFactory.

Usage

```
## S3 method for class 'kernelFactory'
predict(object, newdata = NULL, predict.all = FALSE,
  ...)
```

Arguments

object	An object of class kernelFactory, as created by the function kernelFactory
newdata	A data frame with the same predictors as in the training data.
predict.all	TRUE or FALSE. If TRUE and rp and cp are 1 then the individual predictions of the random forest are returned. If TRUE and any of rp and cp or bigger than 1 then the predictions of all the members are returned.
...	Not used currently.

Value

A vector containing the response probabilities.

Author(s)

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References

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See Also

kernelFactory

Examples

```
#Credit Approval data available at UCI Machine Learning Repository
data(Credit)
#take subset (for the purpose of a quick example) and train and test
Credit <- Credit[1:100,]
train.ind <- sample(nrow(Credit),round(0.5*nrow(Credit)))

#Train Kernel Factory on training data
kFmodel <- kernelFactory(x=Credit[train.ind,names(Credit)!= "Response"],
          y=Credit[train.ind,"Response"], method=random)

#Deploy Kernel Factory to predict response for test data
predictedresponse <- predict(kFmodel, newdata=Credit[-train.ind,names(Credit)!= "Response"])
```

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